

Appn. No.: 10/762,124
Arndt. Dated: August 22, 2006
Reply to Office Action dated: May 22, 2006

Remarks

These remarks in response to the Office Action dated May 22, 2006. This reply is timely filed. At the time of the Office Action, claims 1-10, 12, 14, 16, and 17 were pending in the application. Claims 12, 14, 16, and 17 were allowed. Claims 3 and 5-7 were objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form. Claims 1, 2, 4, and 8-10 were rejected under 35 USC §102(b). Claims 1, 3, and 5 have now been amended.

I. Allowable Subject Matter

Applicant notes with appreciation that claims 12, 14, 16, and 17 were allowed. Claims 3 and 5-7 were objected to as being dependent upon a rejected base claim but the Examiner has indicated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response, claims 3 and 5 have now been amended as appropriate in each case to place them in condition for allowance. Please charge Deposit Acct. No. 08-0870 in the amount of \$400 for two (2) additional independent claims pursuant to Fee Code 1201. Claims 6 and 7 are allowable at least on the basis of their dependence on amended claim 5.

II. Rejection based on 35 USC §102(b)

Claims 1, 2, 4, and 8-10 were rejected under 35 USC §102(b) as being anticipated by U.S. Published Patent Application No. 2002/0067883 to Malone, et al. ("Malone et al."). Malone et al. discloses a multilayer ceramic carrier for an optical

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element. The carrier includes a terraced cavity for retaining the optical element, such as a vertically receiving/emitting optical element and/or a photodetector.

In addition, Malone et al. discloses a method of forming the multilayer ceramic carrier. The method includes forming a plurality of layers comprised of ceramic tape, joining the layers, and then co-firing the stacked layers (Malone et al., Abstract, lines 12-15). Notably, optical element(s) is/are wire bonded within a cavity of the multilayer ceramic carrier and enclosed by a plastic optical housing (Malone et al., ¶55, lines 23-27; ¶60, lines 9-14; ¶74, lines 12-26; Figs. 4 and 13). The optical housing also includes an aperture for securing an optical fiber. The optical housing is joined to the multilayer ceramic carrier using a UV-curable epoxy (Malone et al., ¶87, lines 8-11).

Applicant's independent claim 1 recites that the optical band gap (OBG) structure is coated with a surface binding material. However, Malone et al. fails to teach the step of coating its optical element with a surface binding material so as to adhere to the ceramic carrier. Instead, Malone et al. teaches that the optical elements (i.e. VCSEL 2 and photodetector 4) can be wire-bonded to a conductive trace disposed within a terraced cavity of the ceramic carrier (Malone et al., ¶55, lines 23-27; ¶60, lines 9-14; Fig. 4). Alternatively, Malone et al. teaches that the optical elements can be integrally formed on the same substrate/carrier (Malone et al. ¶60 lines 19-25). However, under this alternate embodiment, Malone et al. still fails to teach a method in which an optical band gap structure is coated with a surface binding material, inserted into a ceramic substrate, and subsequently fired with the ceramic substrate.

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The only instance in which Malone et al. teaches the use of an adhesive material is when a fillet 164 of UV-curable epoxy is used to adhere a plastic housing 75 to the ceramic carrier 10 (Malone et al. ¶¶87; Fig. 16). In that case, the plastic housing 75 is used to enclose the wire-bound optical element (i.e. VCSEL 2) disposed in a cavity of the ceramic carrier 10 (Malone et al., Fig. 16).

In order to clarify that which is regarded as the invention, Applicant has now also amended claim 1. In particular, amended independent claim 1 recites, in part, that firing operations on the ceramic substrate are performed subsequent to inserting the OBG structure into the ceramic substrate. In contrast, the Malone et al. reference does not teach or suggest placing an optical element in a cavity of the ceramic carrier prior to firing the ceramic layers. This distinction is important. As persons of ordinary skill in the art can appreciate, OBG structures are devices which are not conventionally embedded in a ceramic substrate until after the ceramic tape layers are fired. This is due in part to the thermally generated residual stresses that are produced from conventional firing processes. These residual stresses can cause the OBG structure to crack or separate from the ceramic substrate (please refer to Applicant's Specification ¶¶29-31). Applicant's method of embedding the OBG structure within a substrate minimizes the risk of the OBG component cracking and/or separating from the substrate due to thermally-generated residual stresses.

Claims 2, 4, and 8-10 are believed patentable at least based on their dependence on an allowable base claim.

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III. Conclusion

Applicant has made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. Nevertheless, Applicant invites the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks, Applicant respectfully requests reconsideration and prompt allowance of the pending claims.

Respectfully submitted,

8-22-06
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